

WHAT IS CLAIMED IS :

1. A foreign material removing system for removing foreign material left over on an image holding body of an electronic photography type printing apparatus, the foreign material removing system comprising:

a power source;

an agitating member for agitating the foreign material that is on the image holding body; and

an attracting section for attracting the agitated foreign material by an attraction bias,

the agitating member being electrified in accordance with a voltage applied thereon from the power source, and

the power source alternately switching polarity of the electrified agitating member.

2. The foreign material removing system as set forth in Claim 1 wherein:

the power source applies an alternating voltage onto the agitating member.

3. The foreign material removing system as set forth in Claim 2, wherein:

the power source applies a superimposing voltage that is prepared by superimposing an alternating current voltage on a direct current voltage.

4. The foreign material removing system as set forth in Claim 3, wherein:

the power source causes the direct current voltage of the superimposing voltage to have polarity opposite to polarity of the attraction bias.

5. The foreign material removing system as set forth in Claim 4, wherein:

the power source causes the direct current voltage of the superimposing voltage to be equimultiple of or higher than an break-down voltage.

6. The foreign material removing system as set forth in Claim 3, wherein:

the printing apparatus includes a transcription section for transcribing an image that is formed on the image holding body, onto a sheet by a transcription bias, and

the power source causes the direct current voltage of the superimposing voltage to have the same polarity as the transcription bias.

7. The foreign material removing system as set forth in Claim 3, wherein:

the power source causes the alternating current voltage to have such a value that the agitating member is oscillated by an electrostatic force caused by the alternating current voltage.

8. The foreign material removing system as set forth in Claim 7, wherein:

the power source causes the alternating current voltage of the superimposing voltage to have a frequency that is approximately equimultiple to or approximately a half of a character frequency of the agitating member.

9. The foreign material removing system as set forth in Claim 1, wherein:

polarity of the electrification of the agitating member is alternately switched over when the agitating member touches the non-image region of the image holding body.

10. The foreign material removing system as set forth in Claim 9, comprising:

a transcription section for transcribing the image that is formed on the image holding body, onto a sheet by a transcription bias, the transcription section preventing the transcription bias from being applied onto the non-image region.

11. The foreign material removing system as set forth in Claim 1, wherein:

the agitating member is located in a housing for covering the agitating member.

12. The foreign material removing system as set forth in Claim 1, wherein:

the agitating member is a conductive brush for agitating the foreign material that is on the image holding body.

13. The foreign material removing system as set forth in Claim 1, wherein:

the attracting section includes an electrification roller that (a) electrifies the image holding body by an electrification bias, and (b) attracts, by using the electrification bias as the attraction bias, the foreign material that is on the image holding body.

14. The foreign material removing system as set forth in Claim 13, wherein:

the electrification roller performs *against rotation* with respect to the image holding body.

15. A printing apparatus including a foreign material removing system for removing foreign material left over on an image holding body of an electronic photography type printing apparatus,

the foreign material removing system including:

a power source;

an agitating member for agitating the foreign material that is on the image holding body; and

an attracting section for attracting the agitated foreign material by an attraction bias,

the agitating member being electrified in accordance with a voltage applied thereon from the power source, and

the power source alternately switching polarity of the electrified agitating member.

16. A method of removing foreign material left over on an image holding body of an electronic photography type printing apparatus, the method comprising the steps of:

agitating, by using an agitating member, the foreign material that is on the image holding body; and

attracting the thus agitated foreign material by an attraction bias,

the step of agitating including the step of switching

over polarity of electrification of the agitating member.

17. A foreign material removing system for removing foreign material left over on an image holding body of an electronic photography type printing apparatus, the foreign material removing system comprising:

an electrification roller for (i) performing *against rotation* with respect to the image holding body, (ii) electrifying the image holding body by an electrification bias, and (iii) attracting the foreign material that is on the image holding body; and

a cleaning section for cleaning a surface of the electrification roller by removing the foreign material thus attracted onto the electrification roller.

18. The foreign material removing system as set forth in Claim 17, wherein:

the cleaning section includes a recovering member for recovering, into a developer tank of the printing apparatus, the foreign material thus removed from the electrification roller.

19. The foreign material removing system as set forth in Claim 17, wherein:

the cleaning section is made of a plate or a film,

which touches the surface of the electrification roller.

20. The foreign material removing system as set forth in Claim 19, wherein:

the cleaning section is conductive, and includes an earth system for discharging, from the cleaning section, an electric charge that is generated in the cleaning section.

21. The foreign material removing system as set forth in Claim 19, wherein:

the surface of the electrification roller is made of a raw material having a mold-lubricant property.

22. The foreign material removing system as set forth in Claim 17, wherein:

the electrification bias is a superimposing voltage prepared by superimposing an alternating current voltage on a direct current voltage.

23. The foreign material removing system as set forth in Claim 17, wherein:

a magnetic field is formed on the electrification roller.

24. The foreign material removing system as set forth in Claim 17, comprising:

an electrification adjusting member for electrifying an amount of electrification of the foreign material that is on the image holding body, so as to render the foreign material to have opposite polarity to the electrification bias.

25. The foreign material removing system as set forth in Claim 17, comprising:

a development roller for developing an electrostatic latent image formed on the image holding body, and for attracting the foreign material left over on the image holding body.

26. The foreign material removing system as set forth in Claim 17, wherein:

a narrowest gap between the electrification roller and the image holding body is less than a thickness of a sheet used in the printing apparatus, and greater than a particle diameter of a toner contained in a developer.

27. The foreign material removing system as set forth in Claim 17, wherein:

a developer used in the printing apparatus is a

two-component developer containing a toner and a carrier,
and

a narrowest gap between the electrification roller and the image holding body is less than a particle diameter of the carrier, and greater than a particle diameter of the toner.

28. The foreign material removing system as set forth in Claim 17, wherein:

the printing apparatus performs reversal development.

29. The foreign material removing system as set forth in Claim 28, wherein:

the electrification roller attracts, as the foreign material, the toner that is electrified in opposite polarity to the image holding body.

30. The printing apparatus comprising a foreign material removing system for removing foreign material left over on an image holding body of an electronic photography type printing apparatus, the foreign material removing system comprising:

an electrification roller for (i) performing *against rotation* with respect to the image holding body, (ii)

electrifying the image holding body by an electrification bias, and (iii) attracting the foreign material that is on the image holding body; and

a cleaning section for cleaning a surface of the electrification roller by removing the foreign material thus attracted onto the electrification roller.

31. A method of removing foreign material left over on an image holding body of an electronic photography type printing apparatus, the method comprising the steps of:

electrifying and removing the foreign material on the image holding body, by (i) rendering the electrification roller of the printing apparatus to perform *against rotation* with respect to the image holding body, (ii) electrifying the image holding body by an electrification bias, and (iii) attracting, onto the electrification roller, the foreign material that is on the image holding body; and

cleaning a surface of the electrification roller by removing the foreign material thus attracted onto the electrification roller.

32. The method as set forth in Claim 31, comprising the step of:

developing and attracting, the developing being

performed by using a development roller of the printing apparatus, so as to develop an electrostatic latent image that is formed on the image holding body, and the attracting being performed so as to attract the foreign material left over on the image holding body.

33. A printing apparatus comprising (a) an image holding body for holding, on a surface thereof, a latent image, (b) an electrification apparatus for electrifying the image holding body by applying a voltage onto an electrification member, which is so located around the image holding body that the electrification member does not touch the surface of the image holding body, (c) a development means for developing, by using a developer containing at least toner, a latent image that is formed on the surface of the image holding body by electrification charge, so as to convert the latent image into a toner image, and (d) transcription means for transcribing, onto a transcription material, the toner image thus formed on the image holding body, wherein:

the electrification apparatus is an apparatus for electrifying and cleaning, the apparatus (a) causing the electrification member to attract a left-over developer component that is left over on the image holding body after the transcription, so as to remove the left-over

developer component from the image holding body, and (b) electrifying the image holding body, and the electrification member and the image holding body rotating in such a manner that, in a place where a distance between the electrification member and the image holding body is shortest, facing surfaces thereof move in opposite directions.

34. The printing apparatus as set forth in Claim 33, wherein:

a narrowest gap between the facing surfaces is less than a thickness of the transcription materials, and greater than a particle diameter of a toner that is the left-over developer component.

35. The printing apparatus as set forth in Claim 33, the printing apparatus being of two-component development type in which a two-component developer containing toner and a carrier is used,

a narrowest gap between the facing surfaces being less than a thickness of the carrier that is the left-over developer component, and greater than a particle diameter of the toner that is the left-over developer component.

36. The printing apparatus as set forth in Claim 33,

wherein:

a voltage prepared by superimposing an alternating voltage on a direct current voltage, is applied on the electrification member.

37. The printing apparatus as set forth in Claim 33 wherein:

a magnetic field is formed on the electrification member.

38. The printing apparatus as set forth in Claim 33, wherein:

the electrification apparatus includes left-over developer component recovery means for recovering, into a developer tank of the development means, the left-over developer component thus attracted onto the electrification member.

39. The printing apparatus as set forth in Claim 33, comprising:

foreign material agitating means, in upstream of the electrification member with respect to a direction of rotation of the image holding body, for agitating foreign material that is on the image holding body.

40. The printing apparatus as set forth in Claim 39, wherein:

the foreign material agitating means includes electric charge adjusting means for adjusting an electric charge of the left-over developer component, (a) in case of reversal development, by applying a bias that has opposite polarity to main electrification polarity of the toner, or that has the same polarity as a transcription bias, and (b) in case of normal development, by applying a bias that has the same polarity as the main electrification polarity of the toner, or that has opposite polarity to the transcription bias.

41. The printing apparatus as set forth in Claim 39, wherein:

the foreign material agitating means includes a conductive brush.

42. The printing apparatus as set forth in Claim 33 wherein:

the development means is an apparatus for developing and cleaning, the apparatus including unremoved left-over developer component recovery means for recovering the left-over developer component that is left over on and has not removed from the image holding

body after passing the electrification apparatus.

43. The printing apparatus as set forth in Claim 42, wherein:

the image holding body has a peripheral velocity that is in a ratio with a peripheral velocity of developer supplying means.

44. The printing apparatus as set forth in Claim 42, wherein:

the developer supplying means is so located that the developer supplying means rotates in such a manner that, in a place where a distance between the developer supplying means and the image holding body is shortest, facing surface thereof move in opposite directions.

45. A printing method using a printing apparatus including (a) an image holding body for holding, on a surface thereof, a latent image, (b) an electrification apparatus for electrifying the image holding body by applying a voltage onto an electrification member, which is so located around the image holding body that the electrification member does not touch the surface of the image holding body, (c) development means for developing, by using a developer containing at least toner, a latent

image that is formed on the surface of the image holding body by electrification charge, so as to convert the latent image into a toner image, and (d) transcription means for transcribing, onto a transcription material, the toner image thus formed on the image holding body, the printing method comprising the steps of:

rotating the electrification member and the image holding body respectively in such a manner that, in a place where a distance between the developer supplying means and the image holding body is shortest, facing surfaces thereof move in opposite directions; and

attracting and electrifying, the attracting being performed so as to attract a left-over developer component that is left over on the image holding body after transcription, so as to remove the left-over developer component from the image holding body, and the electrifying being performed to electrify the image holding body.

46. The printing method as set forth in Claim 45, wherein:

a narrowest gap between the electrification member and the image holding body is less than a thickness of the transcription material, and is greater than a particle diameter of the toner that is the left-over developer

component.

47. The printing method as set forth in Claim 45, wherein:

in case where a two-component developer containing the toner and a carrier is used as the developer, a narrowest gap between the electrification member and the image holding body is less than a particle diameter of the carrier that is the left-over developer component, and greater than a particle diameter of the toner that is the left-over developer component.

48. The printing method as set forth in Claim 45, wherein:

a voltage prepared by superimposing an alternating current voltage on a direct current voltage is applied on the electrification member.

49. The printing method as set forth in Claim 45, wherein:

a magnetic field is formed on the electrification member.

50. The printing method as set forth in Claim 45, comprising the step of:

before the left-over developer component is attracted onto the electrification member and removed, adjusting an electric charge of the left-over developer component in advance, (a) in case of reversal development, by applying a bias that has opposite polarity to main electrification polarity of the toner, or that has the same polarity as a transcription bias, and (b) in case of normal development, by applying a bias that has the same polarity as the main electrification polarity of the toner, or that has opposite polarity to the transcription bias.

51. The printing method as set forth in Claim 45, comprising the step of:

recovering, by using the development means, the unremoved left-over developer component that is left over on and has not removed from the image holding body after passing the electrification apparatus.